



UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/721,870	11/26/2003	Kengo Inoue	032136	6083
38834	7590	07/27/2004	EXAMINER	
WESTERMAN, HATTORI, DANIELS & ADRIAN, LLP 1250 CONNECTICUT AVENUE, NW SUITE 700 WASHINGTON, DC 20036			EVERHART, CARIDAD	
			ART UNIT	PAPER NUMBER
			2825	

DATE MAILED: 07/27/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/721,870

Applicant(s)

INOUE ET AL.

Examiner

Caridad M. Everhart

Art Unit

2825

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☐ Responsive to communication(s) filed on ____.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-28 is/are pending in the application.
- 4a) Of the above claim(s) ____ is/are withdrawn from consideration.
- 5) ☒ Claim(s) 10-23 is/are allowed.
- 6) ☒ Claim(s) 1-3, 6, 9, 24 and 26-27 is/are rejected.
- 7) ☒ Claim(s) 4, 5, 7, 8 and 25³²⁷ is/are objected to.
- 8) ☐ Claim(s) ____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on ____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
 - ☐ Certified copies of the priority documents have been received in Application No. ____.
 - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date 11/26/03 ; 2/23/04
- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date. ____.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: ____.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

Claims 1-3, 6, and 9 are rejected under 35 U.S.C. 103(a) as being unpatentable over Nag, et al. (US 6,313,010B1) in view of Chu (US 6,180,493B1).

Art Unit: 2825

Nag et al discloses the steps of forming a polishing stopper(col. 2, lines 24-26), forming a trench by etching said polishing stopper(col. 2,lines 26-30 and 32-34), forming a liner (col. 2, lines 37-40 and col. 3,lines 9-12), and depositing an oxide by plasma CVD(col. 2, lines 48-55), polishing the oxide using the polishing stopper (col. 3,lines 20-24), and etching the stopper layer (col. 3, lines 24-28). Because Nag et al discloses that the liner may be deposited at zero bias and the fill deposited at a higher bias(col. 3, lines 8-17), this satisfies the limitations of claims 2 and 3. It can be seen in Fig. 2 that the reactor is an inductive coupled CVD plasma reactor. That the plasma CVD is high density plasma CVD is implied by the teaching of the ion density(col. 2, lines 56-59), which is a high density.

Nag et al does not teach the multilayer liner.

Chu discloses a liner which is made of of an oxidation layer of oxide(col. 4,lines 28-32), a CVD oxide layer (col. 4,lines 40-45), and a silicon nitride buffer layer (col. 5,lines 14-15). Because of the comprising language of the claims, the presence of more than one layer before the silicon nitride liner is not excluded by the claims.

It would have been obvious to one of ordinary skill in the art to have formed the liner in the method taught by Nag et al as a first oxide layer and a second nitride layer as taught by Chu because Chu teaches that this protects the liner in the step in which the polish stop layer is etched (col. 5,lines 55-67).

With respect to the thickness of the silicon nitride liner, it is within the ordinary skill in the art to determine this in order to protect the liner in the etch step as disclosed by Chu, so

that it would have been obvious to one of ordinary skill in the art to have chosen the thickness of the nitride liner as recited in the claim.

Claims 24 and 27 are rejected under 35 U.S.C. 103(a) as being unpatentable over Dunn, et al. (US 6,258,695B1).

Dunn et al disclose a shallow trench isolation, a silicon liner, a silicon nitride liner(col. 2, lines 5-10), and an oxide fill, and the nitride liner contains carbon, as there is a carbon implantation step(col. 2, lines 42-60). It is expected from Fig. 2D that there will be carbon also in the silicon nitride liner, because in the heating in the deposition and other heating steps there would be diffusion.

Dunn et al is silent with respect to the MOS and CMOS transistors.

It would have been obvious to one of ordinary skill in the art at the time of the invention to have formed the recited MOS and CMOS transistors in the device containing the shallow trench isolation taught by Dunn et al because Dunn et al teach that the shallow trench isolation is for use in bipolar devices(col. 1, lines 48-52), and it is conventional in the art that bipolar devices contain MOS and CMOS devices on the active regions, separated by shallow trench isolation, and the shallow trench isolation taught by Dunn et al is an improvement of shallow trench isolation.

Claim 26 is rejected under 35 U.S.C. 103(a) as being unpatentable over Dunn et al as applied to claim 24 above, and further in view of Nag et al in view of Chu as relied upon above.

Dunn et al is silent with respect to the formation of a divot.

Art Unit: 2825

Nag et al in view of Chu is relied upon for its teaching of the prevention of the formation of a divot(Chu, col. 5, lines 60-65, the teaching of prevention of formation of recess cavities at the top corners of trenches).

It would have been obvious to one of ordinary skill in the art at the time of the invention to have combined the features of the device taught by Nag et al in view of Chu with the device taught by Dunn et al in order to prevent a divot from forming.

Allowable Subject Matter

Claims 10-23 are allowed.

Claims 4,5,7,8, and 25^{and 27} are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Caridad M. Everhart whose telephone number is 571-272-1892. The examiner can normally be reached on Monday through Fridays 7:30-4:00.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Matthew S. Smith can be reached on 571-272-1907. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Art Unit: 2825

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

C. Everhart
7-24-2004


CARIDAD EVERHART
PRIMARY EXAMINER